Listing of Claims

1-108. (Cancelled)

109. (New) A molecular biosensor, the biosensor having two nucleic acid constructs, the nucleic acid constructs comprising :

R^1-R^2-R^3-R^4; and

R^5-R^6-R^7-R^8;

wherein:

R^1 is an epitope binding agent that binds to a first epitope on a target molecule;

R^2 is a flexible linker attaching R^1 to R^3;

R^3 and R^7 are a pair of complementary nucleotide sequences having a free energy for association from about 5.5 kcal/mole to about 8.0 kcal/mole at a temperature from about 21° C to about 40° C and at a salt concentration from about 1 mM to about 100 mM;

R^4 and R^8 together comprise a detection means such that when R^3 and R^7 associate a detectable signal is produced;

R^5 is an epitope binding agent that binds to a second epitope on the target molecule; and

R^6 is a flexible linker attaching R^5 to R^7.

110. (New) The molecular biosensor of claim 109, wherein the target molecule is selected from the group consisting of an analyte, a prion, a protein, a polypeptide, a nucleic acid, a lipid, a carbohydrate, a biomolecule, a macromolecular complex, a fungus, and a microbial organism.

111. (New) The molecular biosensor of claim 109, wherein the target molecule is a protein or polypeptide.

112. (New) The molecular biosensor of claim 109, wherein R^1 and R^5 are each aptamers.

113. (New) The molecular biosensor of claim 109, wherein R^1 is a double stranded nucleic acid and R^5 is an aptamer.

114. (New) The molecular biosensor of claim 109, wherein R^1 is an antibody and R^5 is an aptamer.

115. (New) The molecular biosensor of claim 109, wherein R^1 is a double stranded nucleic acid and R^5 is an antibody.

116. (New) The molecular biosensor of claim 109, wherein R^1 and R^5 are each antibodies.

117. (New) The molecular biosensor of claim 109, wherein R^1 and R^5 are each double stranded nucleic acids.

118. (New) The molecular biosensor of claim 109, wherein R^2 and R^6 comprise a nucleotide sequence having from about 10 to about 100 nucleotides in length.

119. (New) The molecular biosensor of claim 118, wherein R^2 forms a bond with each of R^1 and R^3 and R^6 forms a bond with each of R^5 and R^7, wherein the free energy of the formed bonds is from about 12.0 kcal/mole to about 16.5 kcal/ mole.

120. (New) The molecular biosensor of claim 119, wherein the bonds are covalent bonds.

121. (New) The molecular biosensor of claim 109, wherein R^2 and R^6 are comprised of a bifunctional chemical crosslinker.

122. (New) The molecular biosensor of claim 109, wherein R^2 and R^6 are from 0 to 500 angstroms in length.

123. (New) The molecular biosensor of claim 109, wherein R^2 and R^6 are comprised of non-DNA polyethylene glycol and are from 0 to 500 angstroms in length.

124. (New) The molecular biosensor of claim 109, wherein R^3 and R^7 are from about 4

to about 15 nucleotides in length.

125. (New) The molecular biosensor of claim 109, wherein the R^4 and R^8 comprise a pair of molecules that transfer energy thereby producing a detectable signal.

126. (New) The molecular biosensor of claim 109, wherein the detection means is selected from the group consisting of FRET, fluorescence cross-correlation spectroscopy, flourescence quenching, fluorescence polarization, flow cytometry, scintillation proximity, luminescense resonance energy transfer, direct quenching, ground-state complex formation, chemiluminescence energy transfer, bioluminescence resonance energy transfer, excimer formation, colorimetric substrates detection, phosphorescence, electro-chemical changes, and redox potential changes.

127. (New) A molecular biosensor, the biosensor having two nucleic acid constructs, the nucleic acid constructs comprising :

R^1-R^2-R^3-R^4; and

R^5-R^6-R^7-R^8;

wherein:

R^1 is an epitope binding agent that binds to a first epitope on a target molecule and is selected from the group consisting of an aptamer, an antibody, and double stranded nucleic acid;

R^2 is a flexible linker attaching R^1 to R^3 by formation of a covalent bond with each of R^1 and R^3, wherein R^2 comprises a bifunctional chemical crosslinker and is from 0 to 500 angstroms in length;

R^3 and R^7 are a pair of complementary nucleotide sequences from about 4 to about 15 nucleotides in length and having a free energy for association from about 5.5 kcal/mole to about 8.0 kcal/mole at a temperature from about 21° C to about 40° C and at a salt concentration from about 1 mM to about 100 mM;

R^4 and R^8 together comprise a detection means selected from the group consisting of FRET, fluorescence cross-correlation spectroscopy, flourescence quenching, fluorescence polarization, flow cytometry, scintillation proximity, luminescense resonance energy transfer, direct quenching, ground-state complex formation, chemiluminescence energy

transfer, bioluminescence resonance energy transfer, excimer formation, colorimetric substrates detection, phosphorescence, electro-chemical changes, and redox potential changes;

R^5 is an epitope binding agent that binds to a second epitope on the target molecule and is selected from the group consisting of an aptamer, an antibody, and double stranded nucleic acid; and

R^6 is a flexible linker attaching R^5 to R^7 by formation of a covalent bond with each of R^5 and R^7, wherein R^6 comprises a bifunctional chemical crosslinker and is from 0 to 500 angstroms in length.

128. (New) A molecular biosensor, the biosensor having two aptamer constructs, the aptamer constructs comprising :

R^1-R^2-R^3-R^4; and

R^5-R^6-R^7-R^8;

wherein:

R^1 is an aptamer that binds to a first epitope on a target molecule;

R^2 is a flexible linker attaching R^1 to R^3;

R^3 and R^7 are a pair of complementary nucleotide sequences having a free energy for association from about 5.5 kcal/mole to about 8.0 kcal/mole at a temperature from about 21° C to about 40° C and at a salt concentration from about 1 mM to about 100 mM;

R^4 and R^8 together comprise a detection means such that when R^3 and R^7 associate a detectable signal is produced;

R^5 is an aptamer that binds to a second epitope on the target molecule; and

R^6 is a flexible linker attaching R^5 to R^7.

129. (New) The molecular biosensor of claim 128, wherein the biosensor comprises:

R^1-R^2-R^3-R^4; and

R^5-R^6-R^7-R^8;

wherein:

R^1 is an aptamer that binds to a first epitope on a target molecule;

R^2 is a flexible linker attaching R^1 to R^3 by formation of a covalent bond with each of R^1 and R^3, wherein R^2 comprises a bifunctional chemical crosslinker and is from 0 to 500 angstroms in length;

R^3 and R^7 are a pair of complementary nucleotide sequence from about 4 to about 15 nucleotides in length and having a free energy for association from about 5.5 kcal/mole to about 8.0 kcal/mole at a temperature from about 21° C to about 40° C and at a salt concentration from about 1 mM to about 100 mM;

R^4 and R^8 together comprise a detection means selected from the group consisting of FRET, fluorescence cross-correlation spectroscopy, flourescence quenching, fluorescence polarization, flow cytometry, scintillation proximity, luminescense resonance energy transfer, direct quenching, ground-state complex formation, chemiluminescence energy transfer, bioluminescence resonance energy transfer, excimer formation, colorimetric substrates detection, phosphorescence, electro-chemical changes, and redox potential changes;

R^5 is an aptamer that binds to a second epitope on the target molecule; and

R^6 is a flexible linker attaching R^5 to R^7 by formation of a covalent bond with each of R^5 and R^7, wherein R^6 comprises a bifunctional chemical crosslinker and is from 0 to 500 angstroms in length.

130. (New) A molecular biosensor having three nucleic acid constructs, the nucleic acid constructs comprising:

R^{15}-R^{14}-R^{13}-R^9-R^{10}-R^{11}-R^{12};

R^{16}-R^{17}-R^{18}-R^{19}; and

R^{20}-R^{21}-R^{22}-R^{23}

wherein:

R^9 is an epitope binding agent that binds to a first epitope on a target molecule;

R^{10} is a flexible linker attaching R^9 to R^{11};

R^{11} and R^{22} are a first pair of complementary nucleotide sequences having a free energy for association from about 5.5 kcal/mole to about 8.0 kcal/mole at a temperature from about 21° C to about 40° C and at a salt concentration from about 1 mM to about 100 mM;

R^{12} and R^{23} together comprise a detection means such that when R^{11} and R^{22} associate a detectable signal is produced;

R^{13} is a flexible linker attaching R^{9} to R^{14};

R^{14} and R^{18} are a second pair of complementary nucleotide sequences having a free energy for association from about 5.5 kcal/mole to about 8.0 kcal/mole at a temperature from about 21° C to about 40° C and at a salt concentration from about 1 mM to about 100 mM;

R^{15} and R^{19} together comprise a detection means such that when R^{14} and R^{18} associate a detectable signal is produced;

R^{16} is an epitope binding agent that binds to a second epitope on a target molecule;

R^{17} is a flexible linker attaching R^{16} to R^{18};

R^{20} is an epitope binding agent that binds to a third epitope on a target molecule; and

R^{21} is a flexible linker attaching R^{20} to R^{22}.